

# A Study to Evaluate Risk Factors among Drivers involved in Non-Fatal Road Traffic Accidents

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## ABSTRACT

**Background:** The gradual rise and peak in the graph of mortality and morbidity as a resultant effect of road traffic accidents (RTAs) have been a matter of immense concern worldwide. RTA induced injuries may stand as the second highest cause of disability-adjusted life years in most of the developing countries by 2020. In India, RTAs are mainly due to carelessness and disregard to the traffic as well as safety rules and hence are preventable. Thus, the present study was carried out to identify risk factors and situations associated with drivers of non-fatal RTAs with a prospective to explore preventability. **Methods:** A cross-sectional study interviewing drivers admitted to tertiary care hospital, using a predesigned and pretested proforma to identify risk factors and situations involved in RTAs. Descriptive statistics was applied to assess the nature of vehicle involved, risk factors and association between two attributes was calculated by Chi square test and odds ratio (OR). **Results and Conclusion:** Out of 311 injured drivers, 82.32% were between the age group of 15-45 years. Most of drivers were driving motor cycles (61.74%). Of the motorcyclists who used helmets, majority (92.31%) escaped head injury (OR: 3.94; 95 % CI: 0.92 to 16.91). Other important factors associated with accidents included increased utility of two-wheelers by the youth, over speeding and alcoholism. Also, a delay in first aid delivery services accounted for increase in the morbidity associated with RTAs. Thus, violation of statutory traffic regulations can be linked with considerable number of RTAs, which suggests priority area of intervention.

**Keywords:** Addiction, Alcoholism, Head injury, Odds ratio, Traffic accidents

## INTRODUCTION

Vehicular accidents are a necessary evil of modernization. They are the penalty paid by us for rapid transportation from one place to the other and are commonest cause of unnatural deaths [1]. Road traffic injuries are the ninth leading cause of death globally and by year 2020, it is estimated that it will account for third leading cause of global burden of death and disability [2]. Of these deaths, road traffic accidents (RTAs) are the major cause of death of young men worldwide [3]. This alarming increase in mortality and morbidity owing to RTA has been a matter of great concern globally [4] and is an emerging challenge to the public health. With a focus on RTA and the measures to prevent them, the slogan for the WHO day April 7, 2004 was "Road safety is no accident" [5].

Developing countries of the South-East Asia Region (SEAR) have been passing through significant urbanization, motorization, industrialization and changes in the socio-economic values of societies during the past few decades. Simultaneously, injury related deaths and disability have also increased proportionately, reasons being growth in the numbers of motor vehicles, inadequate traffic planning, poor enforcement of traffic safety regulations, lack of traffic sense among public, inadequacy of health infrastructure and poor access to health care [6].

Another important feature of a typical Indian traffic system are large number of pedestrians and animals

sharing the road way with fast moving and slow moving (e.g. bullock carts) vehicles and there is almost no segregation of pedestrians from wheeled traffic, large number of old, poorly maintained vehicles, large number of motor cycles, scooters and mopeds, low driving standards, large number of buses, often overloaded, widespread disregard of traffic rules, defective roads, poor street lighting, defective layout of cross-roads and speed breakers and an unusual behaviour of men and animals [7].

Accidents, tragically, are not often due to ignorance, but are due to carelessness, thoughtlessness and overconfidence of the drivers [8], hence they are blamed for majority of accidents. Study analyzing road accidents revealed that majority of the accidents were recorded for vehicles in good condition on well-paved straight roads with well-operating traffic light systems [9]. Most of the drivers were in the age group 20-35 years, in good health and at the peak of their mental and physical abilities [10, 11].

Other factors attributable to drivers in various studies include fatigue [12], inexperience [13], sleepiness [14], drugs and alcohol [15]. Motorized two wheelers are at specifically high risks [16]. In India, the adolescents in particular have a tendency not to follow the traffic regulation and are hesitant to wear helmets [17, 18]. Hence, driver's error may be attributed to carelessness, inexperience, lack of knowledge or attention and over-exhaustion or fatigue.

Studies on injured drivers pertaining to the various epidemiological attributes from Indian subcontinent are scanty. The present article views at discussing the various parameters concerning to the drivers, which may help in reducing the burden of this veritable epidemic of RTAs.

## MATERIALS AND METHODS

The present study was a cross-sectional hospital based study conducted in a suburban area of a city in Karnataka, south India. The study population consisted of drivers admitted to tertiary care hospital involved in RTAs. A pilot study was conducted for a period of one month to assess the feasibility of the study by using a predesigned proforma which was found to be satisfactory and hence used for present study.

The present study was undertaken for a period of one year by visiting the hospital on alternate days. 311 drivers were interviewed to obtain information about the various circumstances that led to the accident. Relevant information was recorded in the casualty and in the wards of hospital, with prior written consent of driver or relatives. In cases where the physical and mental condition of the driver did not permit the interview, the parents, relatives or attendants were interviewed. The medical case sheets of the victims were referred for collecting additional information.

## Inclusion Criteria

All the drivers admitted due to RTAs in the tertiary care hospital were included in this study.

**Table 1. Demographic characteristics of drivers**

Age in Years	Male		Female		Total	
	No.	%	No.	%	No.	%
> 15 to < 45	232	81.40	24	92.31	256	82.32
> 45	53	18.60	2	7.69	55	17.68
<b>Total</b>	<b>285</b>	<b>100</b>	<b>26</b>	<b>100</b>	<b>311</b>	<b>100</b>

**Table 2. Nature of the vehicle involved in road traffic accidents**

Category	Male		Female		Total	
	No.	%	No.	%	No.	%
Bicyclist	46	16.14	6	23.07	52	16.72
2-Wheeler	173	60.70	19	73.08	192	61.74
3-Wheeler	9	3.16	0	0	9	2.89
4-Wheeler	25	8.77	1	3.85	26	8.36
Pick truck /van	13	4.56	0	0	13	4.18
Bus	9	3.16	0	0	9	2.89
Heavy vehicle	7	2.46	0	0	7	2.25
Tractor	2	0.70	0	0	2	0.65
Bullock cart	1	0.35	0	0	1	0.32
<b>Total</b>	<b>285</b>	<b>100</b>	<b>26</b>	<b>100</b>	<b>311</b>	<b>100</b>

**Table 3. Factors leading to road traffic accidents**

Pre-existing health problems	Number (n=311)	%
DM/HTN	37	11.90
Blackouts	17	5.47
Visual disability	57	18.33
Auditory disability	07	2.25
None	193	62.05
Stress factors *	Number (n=311)	%
Present	59	18.97
Absent	252	81.03
Duration of driving before the accident	Number (n=311)	%
< 30 minutes	204	65.59
30 min - 2 hours	63	20.26
2 hours - 4 hours	19	6.11
> 4 hours	25	8.04
Nature of Addiction **	Number (n=311)	%
Alcohol	61	19.61
Smoking	48	15.43
Chewing	41	13.18
Snuff	11	3.54
None	176	56.59
Intoxicating effect of alcohol at the time of accident (n=311)	42	13.50
Causes of accidents	Number (n=311)	%
Failed brakes	21	6.75
Over speeding	79	25.40
Technical snags (vehicle)	63	20.26
Others (mobiles, banners posters, distractions, )	19	6.11
Not known	129	41.48

\*Marital conflicts, financial, emotional and job related problems

\*\*Multiple answers

## Exclusion Criteria

Any injury on road without involvement of a vehicle, or involving stationary vehicle was excluded (E.g. person slipping and falling on the road and sustaining injury or person getting injured while washing or loading a vehicle). Deaths due to RTA were also excluded from the study.

The study protocol was approved by the Institutional Ethical Committee. Statistical analysis was carried out using Chi square test ( $\chi^2$ ) and odds ratio (OR)  $p < 0.05$  was considered significant.

## RESULTS

The total sample consisted of 311 injured drivers (285 men and 26 women), admitted to the hospital for treatment due to RTA during the study year.

### Demographic characteristics of drivers

The mean age of the accident victims was 30.05 years in men and 28.46 years in women (Table 1).

## Nature of the vehicle involved in RTAs

Most of the vehicles were two - wheelers 192 (61.74%), followed by bicycles 52 (16.72%) (Table 2).

## Factors leading to RTAs

The factors leading to RTAs are mentioned in detail in Table 3.

Out of the total, 245 (78.78%) owned the vehicle and 39 (12.54%) were employed drivers. While considering the duration of continuous driving before the accident, surprisingly it was found that, a maximum of 204 (65.59%) drivers had driven for less than 30 minutes and only 25 (8.04%) drove continuously for more than 4 hours. Among 258 injured drivers, 256 (99.22%) had valid driving license. About 176 (56.59%) gave the history that they were not addicted or habituated to any substance. 42 (13.50%) drivers of the total 311 drivers admitted, were under the influence of alcohol (Table 3).

## Time lag for the victim to receive the first aid after RTAs

Among the total 311 RTA victims, 238 (76.53 %) did not receive any first aid till they were shifted to the hospital. Among the 73 (23.47%) who received first aid, 45 (61.64%) were provided first aid within the first hour of the RTA.

## Comparison between head injury and helmet used

Out of the total 192 two-wheeler drivers only 26 (13.54%) were using helmet at the time of the accident, of these who wore helmet, as expected only 2 (7.69%) suffered from head injury, while 24 (92.31%) escaped from it, ( $\chi^2 = 3.7410$ ,  $df = 1$ ,  $p = 0.053$ , not significant, OR: 3.94; 95 % CI: 0.92 to 16.91), thus depicting the four fold increase in the risk of head injury in non-helmet users (Table 4).

**Table 4. Comparison between head injury and helmet used\***

Helmet	Head injury		No Head injury		Total (%)
	No.	%	No.	%	
Used	2	7.69	24	92.31	26 (13.54%)
Not used	41	24.70	125	75.30	166 (86.46%)

\* ( $\chi^2 = 3.7410$ ,  $df = 1$ ,  $p = 0.053$ , Not significant)

\* (OR: 3.94; 95 % CI: 0.92 to 16.91)

## DISCUSSION

Due to increasing number of vehicles, poor enforcement and ignorance by the public of traffic rules and various other factors, RTAs have become one of the important causes of morbidity and mortality among young men. The present study was undertaken to focus these factors which influence the occurrence of RTAs with a view of suggesting suitable preventive measures.

This study highlights age of the driver as an important factor which can influence the occurrence of RTAs. As it was observed that, a majority (82.32%) of the drivers were in the age group below 45yrs which indicates that the drivers were in their most active and productive age at the time of the accident. The association of the young drivers with risky driving has been substantiated in the past also [10]. However, in contrast, drivers above 45 yrs involved in accidents were few suggesting a more responsible driving behaviour among them. The observations of the present study also state that there were fewer RTAs involving drivers below 19 years of age, which can be attributed to the fact that driving license issued to a citizen of India only after he/she is 18 years old.

In case of gender being a factor for RTAs, as known about the Indian scenario and also proven from earlier studies, as in suburban Indian cities like Mangalore [4], men drive vehicles more than their women counter parts. The same fact has been established yet again by the present study. (Male: female driver ratio - 11:1). Also, among the female drivers involved in the RTAs, more than 50% were in 20-30 years age group, suggestive of the fact that most of the females in this age group are either college students or working professionals who use two wheelers for transportation. Motorized two-wheeler (61.74%) and bicyclists (16.72%) were the most common vehicles involved in RTAs in this study. Reported rates of vehicles involved in accidents vary with studies carried out in India and its neighbouring countries [6, 8]. In Pondicherry, an urban city in India, highest percentage of drivers involving RTAs has been found to be bicyclists (38.6%), followed by motorcyclists (31.1%) [8]. However, the scenario in Nepal, a neighbouring country of India, buses have been found to be the commonest vehicle involved [6]. In most of the urban cities of India, the chief mode of transport is by buses, but in rural and sub-urban India, most people use motorized two-wheelers and bicycles for traveling even for a short distance [7], making it a usual site of small town roads to be full of motorcycles and bicycles. Thus, these areas are the accident prone zones where over speeding and reckless driving are the chief causes of most of the RTAs. Also, in recent times, two-wheeler usage is increasing at an alarming pace mostly among enthusiastic Indian youth just for the thrill and enjoyment, making them more vulnerable for RTAs.

As per the results of this study the majority of helmet using motorcyclists escaped head injury. Previous studies from India have reported that nearly 70% of motorcyclists drive without the wearing helmets [18]. Ironically, Sharma R et al, have reported that 25% of the drivers in their study group had never worn a helmet anytime during driving their mopeds [17],

which is in sharp contrast to a Nepal study, where all the motorized two-wheeler drivers were protected with helmets during accidents [6]. Moreover, in a suburban set up of India due to the ill maintained roads, more number of two wheelers, pedestrians, stray animals and poor traffic management, the RTAs can result in fatal head injuries and other morbidities. The disregard to the traffic rules among Indian drivers calls for a strict enforcement of traffic regulations which can help prevent these outcomes of RTAs.

Although 99% drivers in the present study possessed valid driving license, easy procurement of the license and no rule of graduated licensing system like that followed in USA [10], makes this positive finding a less useful one regards prevention of RTAs. Hence, a strict graduated system involving a meticulous check for driving errors must be developed in India before a driver is issued a driving license.

78% drivers owned the vehicles they drew, indicating that usage of private transport vehicles by the commuters is on rise as it is time saving and more convenient for most of them. Development and implementation of regular checks of these private vehicles by the concerned official bodies can detect the technical snags and other defects in the vehicle which can reduce the major burden of the RTAs.

Since this study has found that in a suburban Indian city, more than 76% of the RTA victims did not receive first aid after the accident, it would be prudent for the concerned government officials to provide better and accessible first aid centers in the townships and outskirts of the city.

The role of alcohol in impairing driving ability is well documented. However, only 13.50% drivers in this study were brought to the hospital were under influence of alcohol. Frequent and random checks by the traffic police especially at accident prone zones and at night would certainly be a very useful measure to curb this menace further and also to control over speeding, use of mobiles while driving etc, which are few of the important causes in most of the RTAs.

Stipulations regarding the health of the driver need to be made by the traffic control authorities, so that regular checks are made for testing the visual acuity, auditory disabilities and other factors which could hamper the driver's ability to drive carefully so as to avoid RTAs.

## CONCLUSION

The present study concludes that, increased utility of two-wheelers by the youth, over speeding, easy procurement of driving license by the amateur drivers,

disregard to the traffic rules by the drivers and poor traffic management are causative factors for most of the RTAs. The study also voices concern regarding regulations before issuing the driving license and also implementation of traffic regulations which if were stern, could have averted many of the accidents as well as the morbidity and mortality thereof. Providing first aid to the needy at the earliest can be achieved by establishing mobile trauma clinics by the government as well as by voluntary organizations, which will further aid in reducing mortality and morbidity in the RTA victims. The results of this should evoke earnest responses from the government, policy makers and all personnel concerned on how best to reduce the extent of this preventable problem.

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#### **COMPETING INTERESTS**

The authors declare that they have no competing interests.

#### **CONFLICT OF INTEREST**

None

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